

# Quantum leap could aid Moore

Physicists at the University of Bangor in Wales, the Jet propulsion Laboratory, Pasadena, and the California Institute of Technology have developed a lithographic technique based on quantum physics.

A paper published in *Physical Review Letters* suggests that the technique could lead to circuits being etched on to a substrate less than 25nm wide, the theoretical limit using conventional techniques. The scientists suggest the technique may offer a means of Moore's Law continuing beyond the 25nm limit.

Chips are currently being produced with circuits between 220 and 180nm wide.

Sam Braunstein, a reader at Bangor University, said: "With quantum lithography, we could write details smaller than 25nm, at which point classical laws of physics break down and quantum effects

The technique uses entanglement, a quantum effect in which two or more photons become interlinked. Two entangled photons travel as a single unit, but are split up as they travel down the specified path. The two photons act as a single wave, recombined on to a surface.

Due to entanglement effects, the two photons create patterns equivalent to those that would be made by one photon with half the wavelength. This means the entangled pair can produce circuit patterns four times smaller than photons with the same wavelength in a 'classical' set up. Entangling three photons would allow circuits nine times smaller to be created.

Carlos Stroud, a professor of optics at the University of Rochester, New York, said: "There would appear to be rather substantial engineering problems before we

come in. We might even go further and exploit these quantum effects. This would create a whole new type of computer."

get super-dense computer chips. These engineering problems may be a lot tougher than the quantum problem."